

“Axial Loading at MRI in Assessment of Cobb Angles in Idiopathic Scoliosis”

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*Radiological Society of North America scientific assembly and annual meeting program
Oak Brook, Ill, Radiological Society of North America, 2004; 347*

Abstract

Purpose

Recent reports have revealed that repeated x-ray examinations during childhood and adolescence may induce an increased risk for breast cancer in women. Axially loaded MRI using a compression device simulates imaging of the in standing position. The purpose of the present study was to evaluate if measurements of Cobb angle at supine MRI with axial loading in patients with idiopathic scoliosis could replace Cobb angle measurement on standing radiographs.

Method and Materials

22 patients between 12 and 16 years of age were prospectively selected for the study at their first visit to the scoliosis team at Sahlgrenska University Hospital. There were 20 female and 2 male. They had a routine PA standing radiograph. Within two weeks the patients were referred for MRI examination of the thoraco-lumbar spine. The MRI was performed in supine nonloaded as well as in supine with axial load by using a device designed to produce imaging as if in standing position. Saggittal and coronal T1 weighted sequencies were achieved. Cobb angles for primary and secondary curves were measured on xray and MR images using the same reference vertebrae. When measuring on the MR images, the Cobb angles on erect x-rays were not known. The Cobb angles on supine axial loaded MR images were compared to angles on standing x-rays as well as on supine nonloaded MR images.

Results

The mean Cobb angle for the primary curve on xray and MR was 32 and 30 degrees, respectively. The mean Cobb angle for the secondary curve was 23 degrees at x-ray and 24 at axial loaded MR. The mean difference between the major curve Cobb angles on standing radiographs and supine axial loaded MR was 5 degrees with a mean deviation of 4 degrees. The corresponding values for the secondary curve were 5 and 4 degrees as well. The mean difference between the Cobb angle in nonloaded and axial loaded MRI was 7 degrees.

Conclusions

Axial loading at supine MRI increases the measured Cobb angle in idiopathic scoliosis compared to in nonloaded supine MRI. Reduction of radiation dose to scoliosis patients is possible by measuring the Cobb angle at supine axial loaded MR instead of x-ray.